भारतीय मानक
Indian Standard

IS 16382 : 2017
ISO 21179 : 2013

हल्की कन्वेयर बेल्ट — एक चल रहे प्रकाश कन्वेयर बेल्ट द्वारा उत्पन्न इलेक्ट्रोस्टैटिक क्षेत्र का निर्धारण

Light Conveyor Belts — Determination of the Electrostatic Field Generated by a Running Light Conveyor Belt

ICS 53.040.10

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Transmission Devices Sectional Committee, PGD 33

NATIONAL FOREWORD

This Indian Standard which is identical with ISO 21179 : 2013 'Light conveyor belts — Determination of the electrostatic field generated by a running light conveyor belt' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Transmission Devices Sectional Committee and approval of the Production and General Engineering Division Council.

The text of ISO Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain terminology and conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.

b) Comma (,) has been used as a decimal marker while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appear to the following International Standard for which Indian Standard also exists. The corresponding Indian Standard, which is to be substituted in its place, is listed below along with its degree of equivalence for the editions indicated:

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 4287 : 1997 Geometrical Product Specifications (GPS) — Surface texture: Profile method — Terms, definitions and surface texture parameters	IS 15262 : 2002 Geometrical product specification (GPS) — Surface texture: Profile method — Terms, definitions and surface texture	Identical

The technical committee has reviewed the provisions of following International Standards referred in this adopted standard and has decided that they are acceptable for use in conjunction with this standard:

International Standard	*Title*
ISO 22	Belt drives — Flat transmission belts and corresponding pulleys — Dimensions and tolerances
ISO 18573	Conveyor belts — Test atmospheres and conditioning periods
ISO 21181	Light conveyor belts — Determination of the relaxed elastic modulus

Indian Standard

LIGHT CONVEYOR BELTS — DETERMINATION OF THE ELECTROSTATIC FIELD GENERATED BY A RUNNING LIGHT CONVEYOR BELT

1 Scope

This International Standard specifies a test method for the determination of the electrostatic field generated by a running light conveyor belt according to ISO 21183-1.

This dynamic procedure is required because the antistatic behaviour of light conveyor belts cannot in many cases be sufficiently described by measurement of the electrical resistances in accordance with ISO 21178.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable to its application. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 22, *Belt drives — Flat transmission belts and corresponding pulleys — Dimensions and tolerances*

ISO 4287, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Terms, definitions and surface texture parameters*

ISO 18573, *Conveyor belts — Test atmospheres and conditioning periods*

ISO 21181, *Light conveyor belts — Determination of the relaxed elastic modulus*

3 Principle

The test piece is run under specified conditions and produces an electrostatic field, the variation of which is recorded with time.

The test is carried out successively with both sides of the belt in contact with the pulleys.

4 Apparatus (see Figure 1)

4.1 Pair of pulleys, as follows:

a) electrically connected and earthed;

b) made of steel;

c) diameter 200 mm or larger, rim width 120 mm;

d) raw, unplated surface roughness, maximum Ra = 1,6 µm, in accordance with ISO 4287;

e) final coating of chromium plating;

f) drive pulley, fixed, cylindrical;

g) driven pulley moveable for tensioning, crowned in accordance with ISO 22 (h = 0,6 mm).

4.2 Tensioning device, such that the test piece can be loaded according to the relevant $k_{1\,\%}$ value given in Table 1 to achieve uniform surface pressures.

Table 1 — Shaft load required

Modulus of elasticity $k_{1\,\%}$[a] N/mm	Shaft load F N
$k_{1\,\%} \leq 2{,}5$	50
$2{,}5 < k_{1\,\%} \leq 10$	300
$10 < k_{1\,\%} \leq 30$	900
$k_{1\,\%} > 30$	As per agreement
[a] The value of $k_{1\,\%}$ shall be established in accordance with ISO 21181.	

4.3 Drive, such that the belt runs directly from the drive pulley to the measuring device at a speed of 5 m/s.

4.4 Measuring device, either an electrostatic field meter with signal output that gives readings of the electrostatic field strength, E, in volts per metre, or a device that gives a direct reading of the surface potential, U, in volts.

4.5 Recording device, e.g. y/t recorder.

4.6 Means of correction for electrostatic fields

4.6.1 Earthed steel plate equipping the electrode, 200 mm × 200 mm, with the edges bent up with a radius of approximately 10 mm, to correct field distortion created by the measuring electrode. The lower surface of the electrode shall be flush with the lower surface of the steel plate. The size and shape of the perforation of the steel plate shall be adapted to the shape of the electrode used. The gap between the electrode and the steel plate shall not exceed 2 mm (see Figure 1).

4.6.2 Earthed steel plate, 600 mm × 200 mm, with the edges bent up with a radius of approximately 10 mm (see Figure 1), to shield the field to be measured from the field distortion generated by the return side of the test piece.

5 Test piece

5.1 Material

Test piece material shall be new, unused ("virgin"), but shall not be tested sooner than five days after manufacture. It shall be free from contamination and superficial damage.

5.2 Dimension

The test piece shall have an endless length of (2 500 ± 50) mm and a width of (100 ± 1) mm.

5.3 Endless joining

The test piece shall be joined endlessly according to the manufacturer's instructions.

5.4 Conditioning

Before testing, condition the test pieces in accordance with ISO 18573, Atmosphere B, for 24 h, except that for high-conductivity belts, the relative humidity may be reduced to (25 ± 5) %.

6 Procedure

Test conveyor belts which, due to their construction, require pulley diameters of more than 200 mm, with the smallest diameter possible and according to the manufacturer's instructions.

Measure the temperature and relative humidity in the test room.

Clean both pulleys (4.1) and, if necessary, remove any dust from the shielding steel plates (4.6.1 and 4.6.2).

After endlessly joining and conditioning of the test piece, install it on the testing apparatus with the normal running side in contact with the pulleys.

Tension the test piece in accordance with 4.2.

Install the recording device (4.5).

Position the measuring device (4.4) on the centre line of the test piece, 500 mm from the centre of the drive pulley, with a distance of 10 mm to 100 mm between the measuring device and the test piece surface not in contact with the pulley (see Figure 1).

NOTE Experience has shown that a distance of 25 mm is preferable.

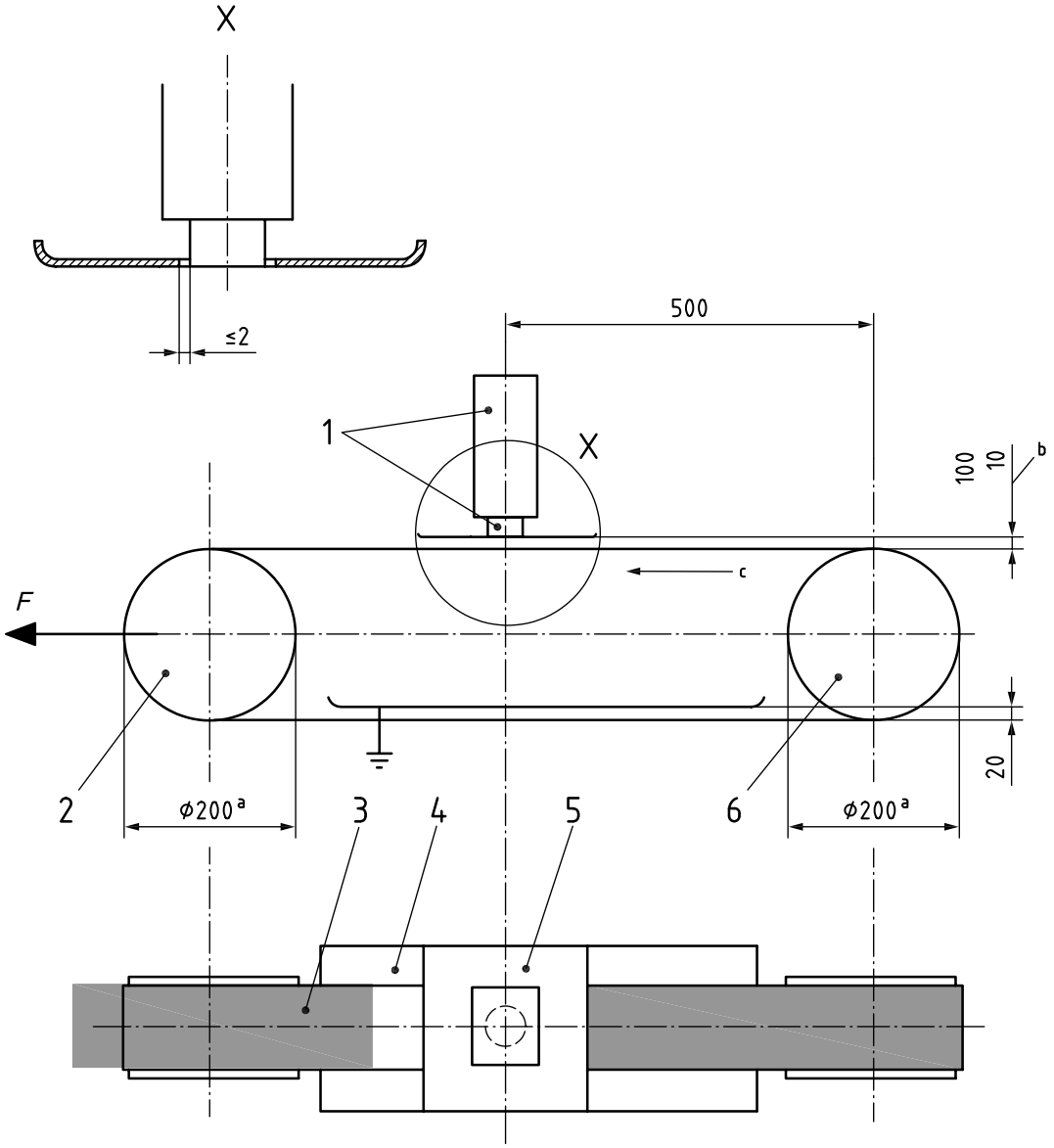
Start the test piece and run it from the drive pulley (4.3) directly to the field measuring device.

Either record the electrostatic field strength, E, in volts per metre or, if the measuring device used gives a direct reading of the surface potential, U, record that value, in volts.

The measurement time shall be 30 min.

Repeat the same procedure with the other side of the belt in contact with the pulleys.

Dimensions in millimetres



Key

1 measuring device with electrode
2 driven pulley, movable, crowned
3 test piece, endless (2 500 ± 50) mm × (100 ± 1) mm
4 earthed steel plate, 600 mm × 200 mm
5 earthed steel plate, 200 mm × 200 mm
6 drive pulley, fixed, cylindrical

a Diameter 200 mm or larger; see Clause 6.
b Measuring distance of test piece surface not in contact with pulleys shall be between 10 mm and 100 mm.
c Direction of run.

Figure 1 — Basic arrangement of test bench for measurement of electrostatic field strength generated by running light conveyor belt

7 Expression of results

The two significant results within the test period shall be, firstly, the maximum value reached and, secondly, a value judged to be constant (i.e. when a change over the final 10 min is less than 10 %). Either the two values of these electrostatic field strengths shall be recorded or, if the measuring device used gives a direct reading of the surface potential, the two values of these surface potentials shall be recorded.

If the electrostatic field strengths are recorded, the surface potential, U, in volts, shall be calculated using the following formula:

$$U = E \times a$$

where a is the distance, in metres, between the measuring electrode and the conveyor belt surface.

These results are valid for virgin material according to 5.1.

If more than one measurement on one side is carried out (several measurements on one test piece or several test pieces), the arithmetic mean of the individual values either of E (calculated) or U (direct reading) shall be taken. All of the values shall be recorded.

8 Test report

The test report shall include the following information:

a) complete designation of the tested conveyor belt material and date of manufacture;

b) $k_{1\,\%}$ value of the test piece(s);

c) reference to this International Standard, i.e ISO 21179, and any necessary exceptions;

d) places from which the test piece(s) were taken;

e) test room temperature and relative humidity;

f) conditioning period;

g) the shaft load, in newtons;

h) indication of belt side in contact with the pulleys;

i) the values of U in accordance with Clause 7;

j) date of test.

Bibliography

[1] ISO 21178, *Light conveyor belts — Determination of electrical resistances*

[2] ISO 21183-1, *Light conveyor belts — Part 1: Principal characteristics and applications*

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

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Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards : Monthly Additions'.

This Indian Standard has been developed from Doc No.: PGD 33 (1426).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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